

14P

"Made available under NASA sponsorship
in the interest of early and wide dis-
semination of Earth Resources Survey
Program information and without liability
for any use made thereof."

E 74-10187
CR-136324

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN
AFRICA, ASIA, AND AUSTRALIA

Edwin D. McKee
U.S. Geological Survey
Denver, Colorado 80225

Carol S. Breed
Cointvestigator
U.S. Geological Survey
Flagstaff, Arizona 86001

1 January 1976

Type I Progress Report for Period 1 November - 31 December, 1973

Prepared for:

Goddard Space Flight Center
Greenbelt, Maryland 20771

APPROVED

JAN 11 1974

W. P. Ketterer
Deputy Chief, Office of
Scientific Publications

E74-10187) A STUDY OF MORPHOLOGY,
PROVENANCE, AND MOVEMENT OF DESERT SAND
SEAS IN AFRICA, ASIA, AND AUSTRALIA
Progress Report, 1 Nov - 31 (Geological
Survey) 12 p HC \$3.00 CSCL 08M G3/13 00187

N74-14051

Unclassified

TYPE I Progress Report
ERTS-A

A STUDY OF MORPHOLOGY, PROVENANCE, AND MOVEMENT OF DESERT SAND SEAS IN
AFRICA, ASIA, AND AUSTRALIA

By Edwin D. McKee and Carol S. Breed

ABSTRACT

Recent acquisition of generally high quality color prints for most of the test sites has enabled this project to make significant advances in preparing mosaics of sand desert areas under study. Computer enhancement of imagery of selected sites, where details of complex dune forms need to be determined, has been achieved with arrival of computer-compatible ERTS-1 tapes. Further, a comparator, recently received, gives precise visual measurements of width, length, and spacing of sand bodies and so improves comparison of patterns in various test sites.

Considerable additional meteorological data recently received on sand-moving winds in China, Pakistan, Libya and other study areas enabled much progress to be made in developing overlays for the dune mosaics. These data show direction, speed, and frequency of winds. Other new data for use in preparing overlays used with ERTS image mosaics include ground truth on moisture control, geologic settings, and plant distribution. With the addition of visual observation data and prints from hand-held photography now being obtained by the Skylab 4 mission, much progress in interpreting the patterns of sand seas for 17 desert sites is anticipated.

Type I Progress Report
ERTS-A

a. Title: A Study of Morphology, Provenance, and Movement of
Desert Sand Seas in Africa, Asia, and Australia

ERTS-A Proposal No.: SR-131

b. GSFC ID No. of P.I.: IN-402

c. Problems relating to progress:

1. Color processing (of bulk color composite prints) lacks quality control and so new orders are frequently necessary in order to complete mosaics. Some progress in solving this problem has apparently been made, as most recently acquired prints have been of high quality.

2. Problems of time and funding as reported earlier have been remedied with the recent receipt of extensions. We will now be able to complete the ERTS-A tasks as planned.

d. Discussion and plans:

1. Computer-compatible ERTS-1 tapes have arrived permitting computer enhancement of imagery of selected sites to progress as described in last Type I progress report (p. 5, pt. 1).

2. Receipt of a comparator has improved our methods of measuring and comparing dune field morphology. It is being used for precise visual measurements of width, length, and spacing of sand bodies.

3. A considerable amount of information concerning meteorological controls has been gathered for dune fields in China, Pakistan, Libya, Mexico, Australia, and South Africa, as well as for several U.S. areas.

Meteorological overlays showing the direction, speed, and percentage frequency of sand-moving winds are in progress for nearly all sites. Additional overlays relating ground truth data on precipitation, vegetation, sand sources, and geographic barriers to sand movement have been started.

Linear density transparencies of selected sites have arrived. This product is especially useful to our project. It makes possible the analysis of dune fields which cannot be readily seen on the standard transparencies. This type of transparency will constitute the standing order for our ERTS-B project.

The visual observations book for Skylab 4 includes 17 sites in desert areas being studied on ERTS imagery. This mission is now in progress and requested hand-held photographs are being taken. These will be of great value to the ERTS-B phase of this project.

e. Results and application:

Many new overlays for the ERTS image mosaics, showing compilations of ground truth including wind data, moisture data and geologic setting, have been prepared and others are underway.

Working classification of eolian sand bodies has been established and is being tested against incoming ERTS images and ground-based observations.

f. Reports:

A paper entitled "Sand Dunes in Desert Areas" was presented by Carol Breed, coinvestigator, at the Fourth Annual Conference on the Application of Remote Sensing of Arid Land Resources and Environment on Nov. 15, and will be published in the Proceedings of this Conference.

At ERTS-1 Symposium of Dec. 10-13 in Washington, D. C., a report on "An Investigation of Major Sand Seas in Desert Areas throughout the World" was given by E. D. McKee, principal investigator. This report was prepared for publication in the Proceedings of the Symposium.

A summary of our ERTS project formed the basis of a program of desert studies on the hand-held photography mission in earth observation on Skylab 4. McKee and Breed attended a session for briefing the astronauts on this mission, on Saturday, Nov. 3, in Houston.

g. Changes in operation:

None

h. Changes in standing order forms:

None

i. ERTS Image Descriptor forms:

Attached

j. Data Request Forms:

Attached

ERTS IMAGE DESCRIPTOR FORM
 (See Instructions on Back)

DATE December 1973

NDPF USE ONLY

D _____

N _____

ID _____

PRINCIPAL INVESTIGATOR Edwin D. McKee

GSFC IN-402

ORGANIZATION U.S. GEOLOGICAL SURVEY

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Dunes			
E1366 - 10012	X			
E1366 - 10014	X			
E1339 - 10545	X			
E1286 - 09191	X			
E1286 - 09193	X			
E1286 - 09184	X			
E1366 - 04483	X			
E1228 - 04131	X			
E1378 - 04133	X			
E1359 - 04074	X			playa
E1359 - 04080	X			
E1342 - 04133	X			
E1381 - 04304	X			
E1381 - 04302	X			
E1381 - 04295	X			
E1333 - 05054	X			
E1324 - 04135	X			playa
E1363 - 04301	X			
E1351 - 05053				Mountains, SNOW
E1351 - 05051				Mountains, SNOW

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (/) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NPDF USER SERVICES
 CODE 563
 BLDG 23 ROOM E413
 NASA GSFC
 GREENBELT, MD. 20771
 301-982-5406

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE _____

NDPF USE ONLY

D _____

N _____

ID _____

PRINCIPAL INVESTIGATOR _____

GSFC _____

ORGANIZATION _____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Dunes			
E1 332-05000	X			
E1 323-04080	X			playa
E1 345-04311	X			
E1 345-04302	X			
E1 345-04305	X			
E1 348-03044	X			
E1 316-03273	X			
E1 316-03280	X			
E1 316-03282	X			
E1 321-03104	X			
E1 240-03053	X			
E1 208-03281	X			
E1 208-03275	X			
E1 320-03272	X			
E1 362-03103	X			
E1 362-03101	X			

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NPDF USER SERVICES
 CODE 563
 BLDG 23 ROOM E413
 NASA GSFC
 GREENBELT, MD. 20771
 301-982-5406

8

ERTS IMAGE DESCRIPTOR FORM
 (See Instructions on Back)

DATE _____

NDPF USE ONLY

D _____

N _____

ID _____

PRINCIPAL INVESTIGATOR _____

GSFC _____

ORGANIZATION _____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Dunes			
E1334-05442	x			
E1352-05141	x			
E1354-05260	x			
E1354-05263	x			
E1353-05195	x			
E1353-05202	x			
E1351-05083	x			
E1371-05194	x			
E1371-05200	x			
E1323-05514	x			
E1323-05521	x			
E1346-06192	x			
E1340-05452	x			lake
E1340-05450	x			
E1359-05514	x			
E1359-05512	x			
E1359-05503	x			
E1359-05505	x			lake

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (/) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NPDF USER SERVICES
 CODE 563
 BLDG 23 ROOM E413
 NASA GSFC
 GREENBELT, MD. 20771
 301-982-5406

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE _____

NDPF USE ONLY

D _____

N _____

ID _____

PRINCIPAL INVESTIGATOR _____

GSFC _____

ORGANIZATION _____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Dunes			
E1364-06193	x			
E1364-06191	x			
E1343-06032	x			
E1343-06030	x			
E1343-06023	x			
E1343-06021	x			
E1343-06014	x			
E1343-06012	x			
E1380-06064	x			river
E1380-06070	x			
E1380-06073	x			river
E1377-00582	x			
E1377-00591	x			
E1377-00585	x			
E1344-01162	x			
E1344-01165	x			
E1344-01160	x			

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (/) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NPDF USER SERVICES
 CODE 563
 BLDG 23 ROOM E413
 NASA GSFC
 GREENBELT, MD. 20771
 301-982-5406

ERTS IMAGE DESCRIPTOR FORM

(See Instructions on Back)

DATE _____

NDPF USE ONLY

D _____

N _____

ID _____

PRINCIPAL INVESTIGATOR _____

GSFC _____

ORGANIZATION _____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Dunes			
E1344-01160	x			
E1320-00433	x			
E1320-00430	x			
E1340-C0542	x			
E1340-00544	x			
E1367-00025	x			
E1368-00081	x			
E1379-04192	x			
E1343-04154	x			
E1386-04590				mountains, faults
E1295-03113	x			
E1341-04025	x			playa
E1358-04022				mountains
E1369-00132	x			
E1369-00135	x			
E1369-00141	x			
E1369-00144	x			
E1324-06585	x			
E1252-06575	x			

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (/) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NPDF USER SERVICES
CODE 563
BLDG 23 ROOM E413
NASA GSFC
GREENBELT, MD. 20771
301-982-5406

11

ERTS IMAGE DESCRIPTOR FORM
 (See Instructions on Back)

DATE _____

NDPF USE ONLY

D _____

N _____

ID _____

PRINCIPAL INVESTIGATOR _____

GSFC _____

ORGANIZATION _____

PRODUCT ID (INCLUDE BAND AND PRODUCT)	FREQUENTLY USED DESCRIPTORS*			DESCRIPTORS
	Dunes			
E1352-06582	X			
E1352-06584	X			
E1350-06471	X			
E1356-07204	X			
E1351-06523	X			
E1353-07033	X			
E1353-07040	X			
E1332-06473	X			
E1357-07263	X			
E1357-07260	X			
E1357-07254	X			
E1370-06574	X			
E1370-06580	X			
C1424-06573	X			
E1424-06590	X			
E1750-06474	X			
E1350-06492	X			
E1350-06485	X			

*FOR DESCRIPTORS WHICH WILL OCCUR FREQUENTLY, WRITE THE DESCRIPTOR TERMS IN THESE COLUMN HEADING SPACES NOW AND USE A CHECK (✓) MARK IN THE APPROPRIATE PRODUCT ID LINES. (FOR OTHER DESCRIPTORS, WRITE THE TERM UNDER THE DESCRIPTORS COLUMN).

MAIL TO NPDF USER SERVICES
 CODE 5G3
 BLDG 23 ROOM E413
 NASA GSFC
 GREENBELT, MD. 20771
 301-982-5406

12

**List of Data Requests to Goddard Space Flight Center during
November-December, 1973**

E1424-03260	E1332-04594	E1108-09250	E1378-05560
E1424-03262	E1332-05003	E1108-09252	E1270-18012
E1424-03265	E1314-04595	E1108-09270	E1270-18014
E1424-06573	E1334-05113	E1108-09273	E1270-18021
E1424-06570	E1295-04544	E1108-09275	E1269-17553
E1331-04535	E1295-04551	E1108-09282	E1269-17560
E1417-06135	E1316-05114	E1108-09284	E1269-17562
E1417-06130	E1331-04575	E1108-09291	E1196-17504
E1105-10565	E1199-09343	E1221-23592	E1197-17554
E1417-06123	E1199-09350	E1221-23594	E1197-17560
E1417-06121	E1199-09373	E1222-00001	E1287-17555
E1417-06114	E1308-08113	E1221-23580	E1287-17561
E1417-06191	E1388-05105	E1224-00084	E1069-17434
E1417-06185	E1386-04590	E1224-00102	E1069-17441
E1417-06182	E1384-04470	E1224-00105	E1069-17443
E1417-06173	E1398-04251	E1224-00111	E1412-05435
E1241-13505	E1199-09311	E1331-04542	E1412-05442
E1241-13511	E1199-09314	E1331-04544	E1240-13424
E1241-13514	E1199-09320	E1388-03264	E1240-13430
E1241-13520	E1199-09323	E1224-03165	E1240-13433
E1241-13523	E1199-09325	E1224-03163	E1240-13435
E1241-13525	E1199-09332	E1373-00364	E1240-13442
E1241-13532	E1199-09334	E1373-00371	E1240-13444
E1241-13534	E1199-09341	E1353-00250	E1408-05251
E1247-12411	E1111-09444	E1377-05513	E1408-05254
E1247-12404	E1111-09483	E1377-05510	E1239-13424
E1247-12402	E1111-09485	E1384-04015	E1239-13431
E1247-12413	E1114-09595	E1404-03161	E1239-13433
E1247-12420	E1115-10060	E1404-03155	E1239-13440
E1163-14531	E1115-10053	E1408-00305	E1239-13442
E1163-14525	E1116-10114	E1408-00303	E1239-13445
E1163-14534	E1111-09451	E1408-00314	E1239-13451
E1377-04075	E1107-09241	E1424-05130	E1239-13413
E1377-04072	E1107-09244	E1407-05191	E1122-19550
E1412-00534	E1107-09250	E1407-05193	E1122-19553
E1403-03100	E1107-09253	E1407-05200	E1122-19544
E1403-03103	E1107-09255	E1407-05202	E1177-20001
E1403-03094	E1110-09363	E1407-05202	E1241-13541
E1340-05450	E1110-09365	E1407-03320	E1241-13543
E1412-17492	E1110-09381	E1407-03323	E1239-13415
E1126-05581	E1282-10405	E1407-03314	E1239-13422
E1109-09322	E1282-10411	E1029-17220	E1245-14103
E1111-09435	E1282-10414	E1103-17330	E1245-14105
E1159-17451	E1109-09302	E1104-17384	E1245-14112
E1131-06321	E1109-09304	E1104-17391	E1245-14114
E1109-08054	E1109-09311	E1030-17260	E1246-14155
E1109-08054	E1109-09331	E1414-04125	E1246-14161
E1187-06433	E1109-09334	E1414-04123	E1247-14213
E1107-09194	E1109-09340	E1414-04120	E1247-14220
E1107-09200	E1109-09343	E1417-06180	E1387-05050
E1107-09203	E1109-09345	E1410-17382	E1387-17093
E1107-09205	E1109-09352	E1032-17373	E1421-03094
E1107-09223	E1109-09354	E1378-05574	E1421-03101
E1107-09230	E1109-09361	E1378-05571	E1413-05500
E1107-09232	E1109-09363	E1378-05565	E1413-05503